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GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Meetings of December, January, February, and March and Elections to Fellowship. Regular monthly meetings of the American Geographical Society were held at the Engineering Societies' Building, 29 West Thirty-ninth Street, on December 20, 1921, January 24, February 21, and March 21. At the December meeting Mr. William Beebe gave an admirably illustrated lecture on "A Naturalist in British Guiana Jungles," describing the work of the Tropical Research Station of the New York Zoological Society at Kartabo, British Guiana, of which he is director. At the January meeting, after presentation of the annual reports, of the Society (printed below), a timely address on the "Political Geography of the Pacific" was given by Professor Albert Bushnell Hart. At the February meeting Professor A. V. Williams Jackson spoke on "Travels in Persia." Professor Jackson, who has made three research expeditions to Persia, recently revisited that country as a member of the American Committee for Persian Relief. On January 3 under the joint auspices of the American Geographical Society, the Oriental Club of New York, and the Columbia University Institute of Arts and Sciences a lecture was given at the Horace Mann Auditorium by Mr. Henry Lee Shuttleworth, District Officer of the Punjab, on "The People and Scenery of the Western Himalayan Countries between Simla and Kashmir." A selection of photographs and other illustrative material from Mr. Shuttleworth's collections was on exhibition at the Society's building from January 3 to January 5. At the meeting of March 21 Mr. Fred Payne Clatworthy gave a lecture on "Colorado and the Southwest in Natural Colors," illustrated by autochrome slides.

At the last meeting for the season, to be held on April 25, the Society will be honored by Mr. John W. Davis, late Ambassador to Great Britain who will speak on "The Unguarded Boundary."

At the December, January, and February meetings, President Greenough presiding, there were presented with the approval of the Council the names of 96 candidates who were duly elected as Fellows of the Society.

Annual Reports of the Society. At the annual meeting of the American Geographical Society, held on January 24 at the Engineering Societies' Building, 29 West Thirty-ninth Street, the annual reports of the Council, of the Treasurer, and of the Special Committee were read as follows:

REPORT OF THE COUNCIL

To the Fellows of the Society:

The record of the past year has been marked by activity and progress in the established purposes of the Society. The primary effort is directed to the production and publication of scientific and original geographical papers which it is believed will afford not only interest and information to the Fellows of the Society, but will add very substantially to permanent geographic knowledge.

As a necessary corollary to such endeavors no effort is spared to maintain the library as an efficient instrument for scholars and writers. The progress during the past year in cataloguing and in additions exceeds that of any similar period. Additions during the year comprise 1,401 books, 720 pamphlets, 6,700 periodicals, 3,182 maps, 77 atlases. The collection now numbers 59,331 volumes of books and pamphlets and 53,903 atlases and maps.

The labor conditions in the printing trade caused greatly increased delay and expense in production of books and printed matter, but notwithstanding this we have completed the issue and distribution of the two important books notified last year; namely, "Battlefields of the World War: A Study in Military Geography" by Professor D. W. Johnson, and "The New World: Problems in Political Geography" by Dr. Isaiah Bowman. These publications have elicited warm praise from many of our Fellows and from eminent outside sources.

There are now in preparation various issues for the new year, some of which have already emerged from the printer and the distribution of which will receive due notice. We may briefly enumerate some of the titles without dwelling upon the contents, which will be duly chronicled in issues of the *Geographical Review*:

1. "Palisades Interstate Park"—a publication of particular interest and usefulness to the citizens of New York.
2. "The Agrarian Indian Communities of Highland Bolivia"—an intensive study of community organization amongst the primitive inhabitants of that country.
3. "The Position of Geography in British Universities"—a study in educational geography of wide scope and great usefulness in education.
4. "Recent Colonization in Chile"—which deals with the racial composition of the Chileans of today and with colonization methods of the government.
5. "The Rainfall of Chile"—a technical study of rainfall distribution that has influenced settlement.
6. "The Land System of Mexico"—a penetrating study of the evolution of a distinctive system of landownership and use.
7. "Legendary Islands of the Atlantic"—a charming and scholarly book on a classic theme.
8. "The State of Geographical Knowledge in the Eleventh and Twelfth Centuries"—a study of historical geography and the development of geographical thought.
9. "Walk Book of New York"—which promises to be fully as useful as the published booklet on the Palisades Park.
10. "The Face of the Earth as Seen from the Air"—a study in airplane geography that will be fully illustrated.

Announcement has already been made of the forthcoming publication of Bering's Voyages and Steller's Journal, which are related publications and will be issued together. The former will contain Bering's Log Book and a map showing his route.

There is ready for publication in co-operation with the National Research Council manuscript and maps dealing with the soils, vegetation, land classification, and rainfall of Africa.

The Alaska Road Commission of the United States has appropriated funds for the production by the Society of a map of Alaska on a scale of 1 : 1,250,000, a work involving compilations from all published and some unpublished sources, which promises to have high value in the development of the territory.

The publication of the *Geographical Review* as a quarterly periodical has met with unanimous approval. The volume of matter printed for 1921 is not far short of that printed in the monthly numbers of the *Review* in the previous year. The high standard of technical execution and the scholarly character of the articles have been matters of wide comment and assurance is given that the *Review* constitutes one of the three or four best publications of its kind in the world today.

Various other activities of the Society may be briefly alluded to.

The lectures have been well attended and appreciated. The speakers have been as follows: Mr. Robert Cushman Murphy, Dr. Edward L. Stevenson, Dr. Robert F. Griggs, Dr. D. G. Hogarth, Dr. Charles K. Edmunds, Mr. Alan G. Ogilvie, His Serene Highness Albert I, Prince of Monaco, Mr. J. O. P. Bland, Prof. Henry E. Crampton, Mr. William Beebe.

The work initiated in the geography of Hispanic America and Brazil, as described in last year's report, has been actively prosecuted with important and satisfactory results. From time to time there will be published in the *Geographical Review* a summary of activities in this department.

The annual convention of the Association of American Geographers was held for two days in April, 1921, under the auspices of this Society and was the occasion for an interchange of papers and consultation amongst distinguished representatives from various parts of the country. The Annals of the Association, which are published with the co-operation of our Society, maintain their high standard of useful contribution to science.

The Cullum Geographical Medal of the Society was bestowed upon Albert I, Prince of Monaco, for his distinguished scientific work in oceanography.

The Society has been called upon by the Government authorities to assist the Department of Justice in the study of the boundary dispute between Texas and Oklahoma along the line of the Red River for about five hundred miles. This call from the Government is a distinction of which the Society may well be proud and is in line with former service rendered by the Society in the Guatemala-Honduras Boundary dispute and at the Paris Peace Conference.

Mr. W. L. G. Joerg, Editor of the Research Series, was granted leave of absence during

the summer months for study amongst the departments of geography in European universities. He acted also as the Society's representative at the Centenary Celebration of the Geographical Society of Paris and attended the meetings of the Section of Geography and Geology of the British Association at Edinburgh. A report of his work will appear in the July number of the *Geographical Review*.

The number of the Fellows of the Society is 3,850, of whom 404 are Life Fellows.

The report of the Treasurer submitted herewith gives a condensed balance sheet and a summary of the income and expenses of the Society.

The staff of the Society deserves most cordial expression of appreciation for the efficiency of its work.

By order of the Council

PHILIP W. HENRY
Chairman

January 19, 1922

REPORT OF THE TREASURER FOR 1921

Receipts and Expenses

On December 31, 1920, there was a balance of income account	\$465.60
During the year there have been received from annual dues, interest on investments, and sales of publications	67,904.78
	<hr/> \$68,370.38
There has been expended for salaries, house expenses, library, meetings, publications, postage, insurance, etc.	80,240.99
	<hr/>
Balance carried to Capital Account	\$11,870.61

Condensed Balance Sheet

Cash	\$18,889.30	Annual dues paid in advance	\$2,647.75
Sundry balances	236.20	Monograph Publication Fund	3,821.34
Balance of Capital Accounts	10,423.25	Hispanic-American Research Fund	7,618.31
		Sundry deposits and reserves	6,400.11
		Special deposits	9,061.24
			<hr/>
	<hr/> \$29,548.75		\$29,548.75

HENRY PARISH
Treasurer

REPORT OF THE SPECIAL COMMITTEE

January 19, 1922

The Special Committee appointed December 15, 1921, to nominate and invite suitable persons to fill vacancies which will occur in the offices of the Society at the date of its annual meeting in January, 1922, respectfully report that they recommend the election of the following gentlemen to the offices designated:

		TERM TO EXPIRE IN
<i>President</i>	John Greenough	1923
<i>Vice President</i>	James B. Ford	1925
<i>Recording Secretary</i>	Hamilton Fish Kean	1925
<i>Treasurer</i>	Henry Parish	1923
<i>Councilors</i>	{ Levi Holbrook Archer M. Huntington William C. Potter Charles A. Peabody Philip A. Carroll	1925
Philip W. Henry W. Redmond Cross Paul Tuckerman	} <i>Committee</i>	

Election of Honorary and Corresponding Members. At the meeting of the Council of the American Geographical Society held on February 16 a notable addition was made to the Society's membership lists in the elections of Honorary and Corresponding Members. No elections to these classes of membership had been held since 1918; and the present list, which is unusually long, may also be described as unusually representative and distinguished. The list follows:

HONORARY MEMBERS

MAJOR GENERAL ADOLPHUS WASHINGTON GREELY, of the United States Army (retired). General Greely is one of America's most distinguished Arctic explorers. His most important exploratory work has been described in "Report on the Proceedings of the United States Expedition to Lady Franklin Bay, Grinnell Land." He is the author of the "Handbook of Polar Discoveries" and of many papers on the climatology of the United States.

COLONEL SIR THOMAS HUNGERFORD HOLDICH, K. C. M. G., K. C. I. E., C. B. Colonel Holdich is a Vice-President of the Royal Geographical Society. He was formerly Superintendent of the Frontier Surveys, India, on which country he has written several notable works. He is an authority on boundary problems, his best known writings in this field being "Countries of the King's Award," "Political Frontiers and Boundary Making," and "Boundaries in Europe and the Near East."

LUCIEN GALLOIS, professor of geography, University of Paris. M. Gallois is one of the senior geographers of France. His earlier interests were in historical geography, in which domain "Les géographes allemands de la renaissance" is his chief work. He has since devoted himself to phases of human and regional geography, to which period belong "Régions naturelles et noms de pays: Étude sur la région parisienne" and numerous papers. Professor Gallois is one of the editors of the *Annales de Géographie*.

CORRESPONDING MEMBERS

GUNNAR ANDERSSON, professor of economic geography at the College of Commerce, Stockholm. Professor Andersson is president (1922) of the Swedish Anthropological and Geographical Society and editor of the Society's two periodical publications, *Ymer* and the recently founded *Geografiska Annaler*. He is the author of notable contributions in the field of plant geography, more particularly on the evolution of the post-glacial vegetation of Scandinavia.

CHARLES RAYMOND BEAZLEY, professor of history in the University of Birmingham, England. Professor Beazley is a member of the Council of the Royal Geographical Society. His work in historical geography is especially known through "The Dawn of Modern Geography."

JOSÉ J. BRAVO, Director of the Cuerpo de Ingenieros de Minas y Aguas, Lima, Peru. Señor Bravo is the author of many technical papers in earth sciences and an ardent worker for the promotion of geographical knowledge of Peru. He is president of the recently organized Peruvian Association for the Advancement of Science.

JAMES HENRY BREASTED, professor of Egyptology and oriental history and director of the Haskell Oriental Museum of the University of Chicago. Dr. Breasted's appreciation of the geographical factor in history is admirably illustrated in his important textbook, "Ancient Times: A History of the Early World."

JEAN BRUNHES, professor of geography, Collège de France, Paris. Professor Brunhes is known as one of the chief interpreters of human geography, author of that already classic work, "La géographie humaine." He has recently written two other important books in his chosen field—"Géographie humaine de la France" (Tome 1 of "Histoire de la nation française") and, with Camille Vallaux, "La géographie de l'histoire" (reviewed in this number of the *Geographical Review*).

HENRY CHANDLER COWLES, professor of botany at the University of Chicago. Dr. Cowles is the author of a "Textbook of Plant Ecology" and a student of many practical ecological problems.

BARON GERARD DE GEER, professor of geology at the University of Stockholm. Baron De Geer's chief work has been done in the field of post-glacial chronology, and his studies embrace the Fenno-Scandinavian realm and northeastern North America. He has also carried out geological and geographical investigations in Spitsbergen.

ALBERT DEMANGEON, professor of geography at the University of Paris. M. Demangeon,

well known as the author of a model regional geography, "La Picardie," is especially interested in the economic phases of geography. His striking study of the effects of the War on world commerce and industry has been published in Europe under the title "Le declin de l'Europe" and in America as "America and the Race for World Dominion."

GUILLAUME GRANDIDIER. M. Grandidier is secretary of the Geographical Society of Paris and editor of its journal, *La Géographie*. The chief sphere of his work is Madagascar. He has made important contributions to our knowledge of the natural history, history, and geography of the island. These include "Madagascar au XIXe siècle: Géographie, ethnographie, et zoologie;" "Bibliographie de Madagascar;" and, in collaboration with M. Alfred Grandidier, "Collection des ouvrages anciens concernant Madagascar" and "Ethnographie de Madagascar."

DAVID GEORGE HOGARTH, C. M. G., Keeper of the Ashmolean Museum, Oxford, England. Dr. Hogarth is intimately acquainted with the Near East, and, while his interests are primarily archeological, he has made notable contributions to the geography of that region, more particularly in "The Nearer East" and "The Penetration of Arabia." He is a member of the Council of the Royal Geographical Society.

MARK JEFFERSON, professor of geography at the State Normal College, Ypsilanti, Michigan. Professor Jefferson's extensive and original geographical writings are chiefly concerned with human geography and especially the distribution of population. He was leader of the American Geographical Society's expedition to the A. B. C. countries in 1918. The first part of the report of his investigations has been published in the American Geographical Society's Research Series as "Recent Colonization in Chile" and "The Rainfall of Chile."

CURTIS FLETCHER MARBUT, in charge of soil survey of the Bureau of Soils, U. S. Department of Agriculture, Washington, D. C. Dr. Marbut is a student of the application of physiography to the distribution and use of soils. He is joint author of a work on the soils of Africa to be published shortly by the American Geographical Society in collaboration with the National Research Council.

OLINTO MARINELLI, professor of geography at the Royal Institute of Higher Studies of Florence. Professor Marinelli is one of the foremost geographers of Italy and one of the joint editors of the *Rivista Geografica Italiana*. He has done important work in both physical and human geography. Many of his studies relate to the Italian Alps.

JOHN LINTON MYRES, O. B. E., Oxford, England. Professor Myres has devoted himself primarily to the study of Mediterranean archeology in its geographical setting. He is most widely known as the author of "The Dawn of History." He is a member of the Council of the Royal Geographical Society.

CHARLES RABOT. Dr. Rabot is a member of the Council of the Geographical Society of Paris and for eighteen years was editor of its journal, *La Géographie*. He is the foremost French authority on the geography of Scandinavia and the Arctic and the author of several books and numerous papers on these regions. He has also specialized in glacial studies.

SIR AUREL STEIN, K. C. I. E. Dr. Stein is Superintendent of the Indian Archeological Survey. His several explorations in Central Asia have resulted in notable advance in our knowledge of the early relations between China and the Western world. His latest publication is the monumental work "Serindia: Detailed Report of Explorations in Central Asia and Westernmost China."

LIEUTENANT COLONEL JEAN TILHO, of the French Army. For many years Commandant Tilho has been engaged in the pacification and administration of territories in the central Sudan. His important investigations of the period 1906-1909 have been published as "Documents scientifiques de la mission Tilho." During 1912-1917 he conducted a remarkable series of explorations in the regions of Tibesti, Erdi, Borku, and Ennedi, northeast of Lake Chad.

FREDERICK JACKSON TURNER, professor of history, Harvard University. Dr. Turner is a member of the Harvard Commission on Western History and of the National Board for Historical Service. He is the author of "The Frontier in American History" and "The Rise of the New West." His studies are especially distinguished by the application of geographical science to historical research.

ROBERT DECOURCY WARD, professor of climatology at Harvard University. Professor Ward is one of the leading authorities on climate in the United States. He is well known as the author of "Climate: Considered Especially in Relation to Man" and as the translator of Volume I of Hann's "Handbuch der Klimatologie."

NORTH AMERICA

Stages in the Development of the Sheep Industry in the United States. The history of pastoral industry in the United States is in no small degree a history of the frontier. The part played by cattle raising is well known: that of sheep rearing is less familiar, and it may be of interest therefore to summarize the paper "A Brief History of the Sheep Industry in the United States" by L. G. Connor in the last (1918) Annual Report of American Historical Association (Washington, D. C., 1921, Vol. 2, pp. 93-197).

In the first stage of the industry from its beginnings in 1609 to 1808, when the Embargo Act and its successor, the Non-Intercourse Act, checked importation, sheep raising was limited to the small flocks necessary to supply the wool which practically every household used for its own manufacture of coarse woollen cloth. From 1808 to 1830 the demand for fine wools, formerly obtained from Europe, led to the establishment of many woollen mills; but the repeal of the Acts did much to counteract the stimulating effect of the application of power and the introduction of machinery into the American mills. Recovery came, however, with the return to normal conditions in European affairs in 1830; and the next decade and a half was marked by rapid growth of the industry in the East. It was the period of supremacy for the eastern wool grower, for the West as yet was limited to production for home needs.

By 1845, however, the western migration of the wool sheep had begun on a large scale. The low cost of wool transport as compared with that of other farm products—wool was a profitable product 200 miles from the shipping point—gave such an impetus to the industry in the West that the East, in face of rising land values and increasing feeding costs, began to yield to competition. Decline in the flocks of the East was also accompanied by a characteristic change in the eastern sheep to the mutton type. The rapid advance of the industry in the Middle West during the period 1840 to 1850 slackened in the succeeding decade. The pioneer enterprise now experienced the competition of other branches of husbandry encouraged by the improvement of transportation facilities and by the opening of foreign markets. A particular stimulus was afforded by the market loss of Russian grain during the Crimean War. During the next few years the trend was reversed. The Civil War brought an increased demand for woollen goods to which both East and West responded by a rapid increase in the number of sheep. At the same time wool production on a large scale had commenced in the southern hemisphere—in Argentina, South Africa, and Australasia—and the close of the war brought a sharp decline in the price of wool and a reduction in the size of the flocks, especially in the East and in the North-Central States.

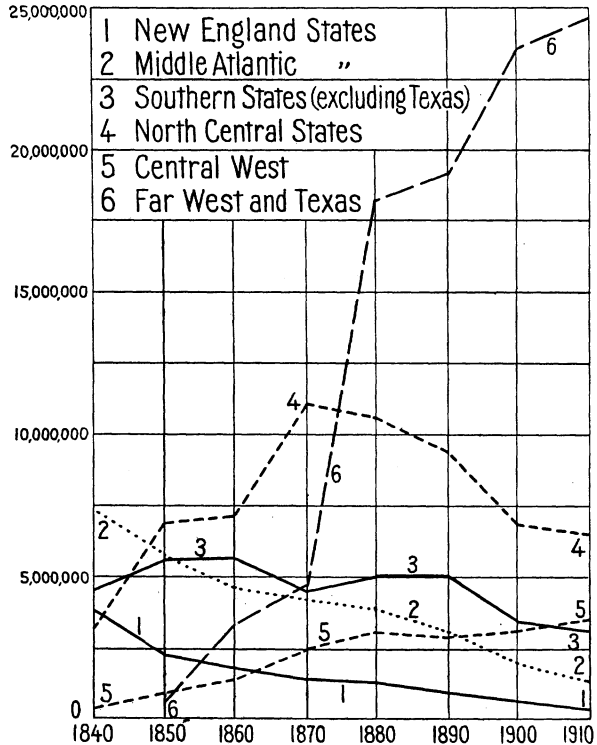


FIG. 1.—Graph showing the number of sheep in the United States by major divisions at successive decades from 1840.

Expansion of the frontier, which had suffered temporary arrest, now entered on the last phase, and with it the last westward shift of the sheep industry. This stage was essentially different from the previous ones because of differences in natural conditions—the range where sheep rearing was a major enterprise as opposed to the farm where it was a minor activity. The greatest gain in the industry was made between 1870 and 1880 when the wave of expansion slackened, in part because of lower wool prices, in part by reason of the more fundamental cause, that it had been started in areas which proved more favorable for other activities, and also through overstocking of the range.

After 1890 the industry became concentrated in the Rocky Mountain region where the range conditions and the remoteness from markets gave this the advantage over other industries.

The frontier has gone: there are now no more great areas of unused land suitable for sheep, and the present grazing areas of the ranges are stocked to capacity. This capacity may indeed be increased by improved management, but such growth is necessarily slow. It seems that the industry has reached a turning point, and a movement of sheep "back to the farm" is likely to be initiated.

Economic Effects of the New England Ice Storm of November 26–29, 1921. What is believed to have been the worst ice storm in the history of New England occurred in that section in the latter part of last November. The storm, which continued unabated for over seventy hours, caused widespread destruction in that region. The sleet intermingled with rain froze to everything it struck; and trees, wires, poles, and buildings became covered with a thick glaze of ice. This glaze covering became thicker and thicker, and under the ever-increasing burden trees and poles groaned and creaked in the wind. Huge limbs, unable to stand the strain, crashed to the ground, and in some instances whole trees were uprooted. Elms, maples, and poplars were particularly heavy sufferers, while oaks and ashes seemed to weather the storm the best. Some idea of the destruction wrought upon trees can be had from the fact that in the city of Worcester, Mass., alone "between 7,500 and 8,000 trees were so badly damaged by the storm that they will have to be taken down at once and that from 5,000 to 7,000 others were so badly mutilated that their replacement must take place within a period of five years."

Trolley wires sagged and snapped, branches and poles fell across the tracks, leading to a complete suspension of service. So great was the damage that in central Massachusetts it was three weeks before trolley service reached a normal state again. Railroad service also was seriously disrupted. Towers carrying high tension power wires were also felled, and this led to many communities being without power. In those places the industries which depended entirely upon electricity were obliged to close until service could be restored. Over 40 cities had their electric lighting systems put out of commission by the storm.

Telegraph and telephone systems were badly crippled. Hundreds of poles and miles of wire fell, and both local and long distance services in many instances were completely demoralized. Hundreds of unskilled men were set to work after the storm cleaning up the debris. Experienced repair crews were brought in from distant points, and in the first ten days after the storm they had strung 100,000,000 feet of wire in an effort to link up New England with the rest of the world. Telephone officials state that the storm will cost them nearly \$1,500,000, while telegraph men say that their loss is equally as great. Altogether it is estimated that property was damaged to the extent of \$3,000,000.

Regarding the cause of the storm G. F. Howe and C. F. Brooks say, "The unusual duration of this ice storm seems to have been due to a large supply of cold air flowing southwards, and of warm air going northwards above it. The cold wind at the surface, as is usual when sleet or ice storms occur, formed a barrier over which the warm wind had to rise. It was this rising and the consequent cooling by expansion which reduced the vapor capacity of the wind aloft and thus produced rainfall. The two currents in this case were surprisingly well balanced" (*Bull. Amer. Meteorol. Soc.*, Vol. 2, 1921, p. 140).

GUY HARVEY BURNHAM

SOUTH AMERICA

A Vegetation Map of Venezuela. A welcome addition to the scant data on Venezuelan vegetation has been made by Henri Pittier, now Director of the Commercial Museum of Caracas. On a map (*Mapa ecológico de Venezuela que demuestra las zonas naturales*, los

cultivos, las vías de comunicación y los principales centros mineros, etc.) of scale 1 : 2,000,000 natural vegetation is represented by five green tints (not too easy to distinguish) and cultivation by two yellow tints. Other useful data shown are communications and mining centers, and the map is accompanied by a descriptive text (*Esbozo de las formaciones vegetales de Venezuela con una breve reseña de los productos naturales y agrícolas, Caracas, 1920*).

The areas ascribed to the main types of vegetation differ considerably from other recent estimates—a higher figure is given to the wooded area while that of the land under cultivation is much reduced. On a total area of some 403,000 square miles (1,043,900 sq. kilometers, *Almanach de Gotha*) the percentages are woodland 52, savana 45, *páramos* 0.35, cultivated land (not including artificial pastures) 0.4. The very small amount of land under actual cultivation, about 1,610 square miles, is striking. The higher figures of earlier estimates may be due to inclusion of other areas of cultivable land or land that has been once under cultivation, for in common with other countries of tropical America the *conuco* system is general in Venezuela, and there are considerable areas of abandoned clearings (compare the article on "The Forests of the Dominican Republic" in this number of the *Review*). Not less striking than the small area devoted to agriculture is the limited use of the forests and grasslands. Their potentialities have long been recognized in a general way, but they still remain almost unknown scientifically.

The forested areas include four types, dry woodlands, monsoon forest, tropical rain forest, temperate forest, to which might be added a fifth, the mangrove forests fringing the Orinoco delta. The dry woodland exhibits two facies, thorn forest and chaparral. Thorn forest (*espinares*) occurs at various points along the coast from the peninsula of Goajira to Paria and on Margarita and the adjacent islands. Chaparral is found in very dry districts of the interior, usually at elevations below 1,000 meters, and in proximity to the savana into which formation it merges without sharp distinction. At times it is difficult to distinguish the chaparral from the *rastros*, second growth vegetation on abandoned clearings. It corresponds on a small scale with the *caatingas* of Brazil. During the rainy season the dry woodlands exhibit a luxuriant verdure, but the appearance of aridity is not entirely lost: it is expressed by several permanent features—the reduced size of the trees, the relative thinness of the undergrowth, and the presence of such forms as the cacti.

The monsoon forests are a transitional formation between the dry woodland and the rain forest. In the dry season they present an appearance similar to the former; in the rainy season to the latter. The monsoon forest is, however, distinguished from the dry woodland by the abundance of lianes and woody vines and the larger size of the trees. It is differentiated from the rain forest by the seasonal change of aspect, for in the dry season a number of the trees completely lose their foliage. This type occupies about two-thirds of the forested area of Venezuela. It covers the maritime cordillera between the thorn woodland and the temperate forests and a broad belt at the foot of the Andes and the western sierras. Its maximum development, however, occurs in Venezuelan Guayana.

The tropical rain forest occupies the Andean slopes south and southeast of Lake Maracaibo, the lower valley of the Tocuyo, and a belt in the south from the Rio Negro and Upper Orinoco basins along the divide of the Guayana highlands. This type has the usual characteristics of the storied tropical rain forest. Emphasis must be laid on the variation of forest composition from place to place regarding which we are almost completely ignorant.

No definite altitude can be fixed as the lower limit of the temperate forest. It is best described as coincident with the zone of maximum precipitation, the cloud zone. It is more varied than the tropical rain forest, and a number of deciduous species are included in its composition. It presents considerable similarity to the monsoon forest from which, however, it may be distinguished by the nature of the ground cover, composed characteristically of tree ferns and including genera of small palms (*Geonoma* and *Chamaedorea*). It attains a considerable development in the Andes and the coast cordillera, but, though the chief towns and agricultural districts occupy clearings in this forest, its characteristics remain little known.

In the Andes and the highest peaks (Silla de Caracas and Pico de Naiguatá) of the coast cordillera the temperate forest gives place at higher elevations to *páramos* whose xerophytic vegetation is comparatively well known.

The common picture of the famous llanos as vast monotonous stretches of grassland is far from correct. As Codazzi has pointed out, there are great variations in different parts. The main types may be shortly described. The *pajales* or *pajonales* extend from the slopes

of the coast cordillera to the center of the llanos. They appear as a thick grassy cover more or less interrupted by bands of monsoon forest and are described as "parkland" or "gallery forest" according to the predominance of savana or woodland. The parklands are best developed towards the west on the foothills and the gently sloping plain traversed by the middle courses of the affluents of the Apure. They offer conditions highly favorable for human settlement—abundant water, fertile land, natural pasture, though the lower parts may suffer from inundation. The gallery forest type is best seen in Alta Guayana along the Caura and other streams. The *mesas* offer a sharp contrast. They are sandy, permeable wind-swept areas, without trees, without water, scantily covered with a herbaceous vegetation. The *mesas* constitute the more elevated portions of the eastern llanos north of the Orinoco (Sievers distinguishes them on his vegetation map of Venezuela, *Petermanns Mitt.*, Vol. 42, 1896). The *morichales* are so named from the occurrence of the moriche palm (*Mauritia flexuosa*). This type borders the left banks of the Apure and Orinoco to near the delta. The soil is humid or swampy, and the vegetation remains green and fresh in the driest season; whence these are concentration points for cattle in search of water and pasture. The southwestern part of the savanas between the Apure and the Meta presents the aspect commonly associated with the llanos, vast level stretches, grass-covered, broken only by occasional groves. A tree border is usually lacking from the watercourses, and during the rainy season great areas are inundated.

These are the main types of the savana, but the transition forms are infinitely varied. Of details regarding the vegetation nothing is known; though such knowledge would form the basis for a serious attempt to utilize the enormous grazing resources of the llanos and would doubtless help to throw light on the vexed problem of their origin (see Eugene Van Cleef: Rainfall Maps of South America, *Monthly Weather Rev.*, October, 1921).

Chilean Ethnological Expeditions to Tierra del Fuego. The fast vanishing tribes that peopled the archipelago south of the Strait of Magellan have been the subject of study by several scientific parties in recent years. (For a complete summary of the results of these and earlier investigations see J. M. Cooper's "Analytical and Critical Bibliography of the Tribes of Tierra del Fuego and Adjacent Territory," in *Bur. of Amer. Ethnology Bull.* 63, Washington, D. C., 1917.) Stimulated by the example of scientists from other countries and having their attention attracted to the region by the celebration of the four-hundredth anniversary of Magellan's discovery of the "Land of Fire," Chileans themselves have recently sent two small expeditions to study the Indians of the region (Martín Gusinde: Expedición a la Tierra del Fuego, and *idem*: Segundo viaje a la Tierra del Fuego, *Publs. Museo de Etnología y Antropología de Chile*, Vol. 2, 1920, pp. 9-43 and 133-163, Santiago).

Señor Gusinde's primary object was to investigate the customs, myths, and language of the two tribes, the Onas and the Yahgans, or Yámanas as he calls them, using the term which they themselves employ. The former are guanaco-hunting people that now have been forced into the forested districts in the southeastern part of the main island; the latter, canoe folk who live in the numerous channels to the south. (Compare the descriptions by C. W. Furlong in the *Geogr. Rev.*, Vol. 3, 1917, pp. 1-15 and 169-187.) Ethnological collections for the Museum in Santiago were also made. Gusinde visited the temporary encampments of the few survivors of these two tribes and was particularly fortunate, it would seem, in that he was able to witness and even to participate in some of the ancient ceremonies still observed by the Yahgans (Yámanas). By his intimate contact with them during several months he was also enabled to collect many data regarding their myths and traditions. The papers above referred to contain, however, little more than the account of the expeditions, since the scientific results are to be published at a later date.

Gusinde also adds somewhat to existing knowledge regarding the third tribe of Fuegian Indians, the Haush, who formerly occupied the extreme southeastern end of the main island, but of whom there are said to remain only two or three representatives. He promises to publish his conclusions regarding the ethnic differences that exist between this tribe and the Onas, as also an opinion concerning the probable origin of the former. Brief mention is made of the Alaculoofs, the other canoe tribe that inhabits the channels of western (Chilean) Patagonia and some of the water passages in western Tierra del Fuego, among the least known of all the tribes of America. (Other recent contributions to the study of these last-mentioned people are, Aureliano Oyarzún: Los indios Alacalufes, *Publs. Museo de Etnología y Antropología de Chile*, Vol. 2, 1920, pp. 165-170; and R. Lehmann-Nitsche: El grupo lingüístico Alakaluf de los canales magallánicos, *Rev. Museo de la Plata*, Vol. 25, 1921, pp. 15-69.)

Of particular geographical interest are Señor Gusinde's corrections of the map of Tierra del Fuego issued by the Chilean Oficina de Mensura de Tierras (1 : 500,000). He states that there exists, near the headwaters of the Rio Grande, a lake called Lago Blanco (longitude $60^{\circ} 5' W.$, latitude $53^{\circ} 58' - 54^{\circ} 12' S.$) which measures about 35 kilometers in length and more than 15 kilometers in width. It appears to be drained by the Rio Blanco, one of the upper tributaries of the Rio Grande, and to receive the waters of the Rio Cochrane (which the map shows flowing directly into the Rio Grande) which in turn drains another lake, Lago Chico, that lies south of Lago Blanco. The river that appears on the map as Rio Cochrane, Gusinde says, is really the Rio Catalina. He also asserts that Lago Lynch is far larger than shown on the map, being some 20 kilometers long, and that it lies 20 kilometers farther west than indicated. Since all of the northern part of the main island is being taken up as sheep ranches, and whites are settling also at many points farther south, as well as upon various smaller islands, it is evident that many further details can soon be inserted in the blank spaces on these maps.

POLAR REGIONS

Norwegian Explorations in Spitsbergen, 1919, 1920, and 1921.

In my article "The Norwegians in Spitsbergen" (*Geogr. Rev.*, Vol. 8, 1919, pp. 209-226) a summary notice was given of the scientific work being carried on by Norwegians in West Spitsbergen. This work includes the topographic and geological mapping of the coal-basin regions and a hydrographic survey of the west coast, of which the prime object was to facilitate navigation of the coal-carrying vessels. Under the direction of M. Adolf Hoel, who has been one of the leaders of the annual expeditions since 1911, the surveys have been continued in 1919, 1920, and 1921 and are now practically completed. A résumé of the most important results has been received in a communication from M. Hoel.

Ice conditions were very favorable in 1919; the west coast indeed had never been so ice-free since 1898. Only during two short periods was drift ice encountered and then only in small quantities. During the summer of 1920 the sea remained almost equally ice-free. From July 6 to August 31 M. Hoel saw only some few masses of ice carried by the northward-setting current. This favorable situation was prolonged during the succeeding winter (1920-1921), which proved to be an absolutely abnormal season. During this entire season the west coast was practically ice-free. Even the fiords were generally open: from

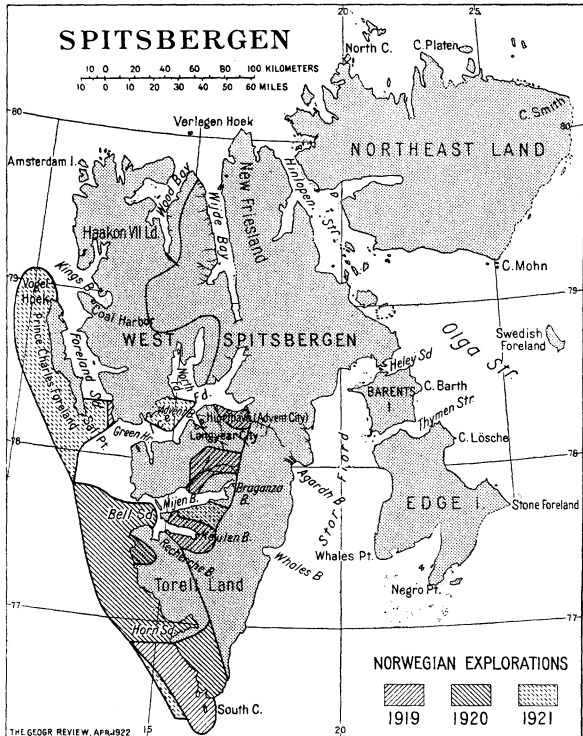


FIG. 1.—Map of Spitsbergen showing the area covered by the Norwegian expeditions of 1919, 1920, and 1921. All of the territory west of the line running from the northwestern corner of Wijde Bay to the east of South Cape has now been surveyed by the series of Norwegian expeditions of 1906-1921. The expeditions of 1906 and 1907 were carried out under the Prince of Monaco, the later expeditions were supported by a subvention from the Norwegian government and by private enterprise.

time to time a layer of ice would form on the surface but only to break up and disappear during some subsequent storm. As early as April 13 a steamer was able to reach the coal wharf of Kings Bay ($78^{\circ} 55' N.$).

On the other hand, by the middle of June ice originating on the east Spitsbergen coast had doubled South Cape and arrived on the west coast, where it remained all summer extending northward to the southern point of Prince Charles Foreland. Broken up by numerous channels it offered, however, no very great difficulty to navigation. This extraordinary seasonal distribution of ice appears to be due to the predominance of easterly winds during the winter of 1920–1921 and the succeeding summer. During the winter the pack ice from the northern and eastern parts of the Barents Sea was frozen fast and could not be carried to the west coast by the easterly winds, but, when the spring break-up came, it moved westward under the influence of the winds—a movement general throughout the polar seas north of Europe.

During the three seasons of 1919–1921 M. Hoel and his colleagues were engaged in the region extending from Ice Fiord to South Cape. Here they surveyed 386 square miles in 1919 and 579 square miles in 1920 but in 1921 only 154 square miles on account of the impediments offered by the great quantity of ice. Thus the survey of the west coast of West Spitsbergen is almost completed, and in the near future Norway will publish a map on the scale 1 : 100,000 or 1 : 200,000 from the northern coast to the most southerly point of the island with a breadth of from 13 to 62 statute miles. A chart of the west coast from Cross Bay to South Cape will also be constructed.

As regards geology considerable results have been obtained during these last three years. The geological map of the coal basin of central Spitsbergen on the scale 1 : 50,000 has been completed from the west coast up to a line from Björndal (a valley opening on to the eastern shore of Ice Fiord to the southwest of Advent Bay) to the mouth of Conway valley in Van Mijen Bay. A geological map of the coal basin on the southern shore of Kings Bay on the scale of 1 : 10,000 has also been made.

On the most recent and most complete geological map of Spitsbergen (*Geologische Kartenskizze von Spitsbergen . . . von A. G. Nathorst in his "Beiträge zur Geologie der Bären-Insel, Spitzbergens und der König-Karl Landes," Bull. Geol. Inst. of Upsala, Vol. 10, 1910*) the entire coast zone between Horn Sound and South Cape is represented as pertaining to the Hecla Hook stage (Lower Silurian, regionally metamorphosed). The field work of 1919 and 1920 has shown that this zone is constituted by less ancient and more varied formations. Besides the Hecla Hook stage Carboniferous, Permian, Triassic, Jurassic, and Cretaceous deposits are represented. Another result no less important is the discovery of crinoids in the Hecla Hook stage, thanks to which it is now possible to assign a definite age to this formation. It has also been ascertained that the Devonian, which in this part of Spitsbergen has been known only from an outcrop on the southern shore of Horn Sound, occupies a relatively extended area towards the south.

In the southern part of the west coast Quaternary shore lines were observed at elevations of 1,100 feet where previously they had not been recognized at elevations above 460 feet.

CHARLES RABOT

British Exploration in Spitsbergen in 1920. In the July, 1921, number of the *Geographical Journal* J. M. Wordie describes the results of his work in Spitsbergen. The first few weeks of the 1920 season were spent in Prince Charles Foreland, the classic ground of Dr. Bruce's explorations. A noteworthy feature of the field work was the ascent of Mt. Monaco, 3,450 feet, whence light was gained on several geological problems regarding both the central mountain group of which this peak is the loftiest member and the island as a whole.

On July 22 the expedition left for Stor Fiord, the great waterway separating Barents and Edge Islands from the main island. The fiord is usually difficult of entry until late summer. With the commencement of the break-up of the polar pack drift ice is carried westward past the mouth of the fiord; a portion swings in and is held there until driven out by northeasterly winds. Such were conditions in 1919, and they appear to be usual. In 1920, an abnormal year (see note on Norwegian Explorations above), the waters were very open, permitting visits to many points on the shores. Among the sections visited were Barents and Edge Islands where it was found that, contrary to general belief, the ice covering is of small extent, being confined to the central and eastern portions; "for

the rest both islands are cut up by wide, moderately fertile valleys, which afford excellent feeding ground for the small remaining stock of reindeer."

One object of the visit to Stor Fiord was revision of the coast line as laid down on the Admiralty Chart which is based on the observations of Nordenskiöld in 1864 (the topographic results of the Russian expedition to measure an arc of meridian in 1898-1902 have never been published and presumably must be regarded as lost). The results accomplished here included elimination from the map of the "low flat island" off Whales Bay, an error traceable to the ancient Dutch charts. Depths of 91 and 75 fathoms were found on the site of the mythical island.

Following the description of the work done in Stor Fiord Mr. Wordie makes some comments on the glaciation of Spitsbergen. Adopting the classification of R. E. Priestley in the Scott Antarctic Expedition memoir on glaciology (now in course of publication), he summarizes it thus: "Spitsbergen is covered in the higher parts by sheets of highland ice having their outlet towards the coast as valley glaciers; as a rule these end as such, but in exceptional cases piedmonts and allied ice-formations are developed. This represents the diminished stage of a much more intense glaciation, and if it is considered desirable can be called the 'Spitsbergen stage' of the glacial cycle." The great extent of former glaciation may be considered proved by the accumulated evidence of such phenomena as high-level erratics and raised beaches (steady rise in the land being correlated with steady decrease in the ice of the interior). Topographical evidence is largely lacking, for under the frigid climate rapid frost weathering and the consequent accumulation of talus tend to a speedy obliteration of glacially molded contours. The opinion is expressed that, with local advances, retreat of the glaciers has been constant since the period of the last great ice flood. At present they are in retreat with few exceptions.

On coal mining, which promises to be the dominant industry in the future of the island, Mr. Wordie quotes some recent and suggestive figures. Coal is now mined at Kings Bay, Cape Boheman, Advent Bay, Green Harbor, and Braganza Bay (head of Van Mijen's Bay). In 1919 some 90,000 tons were exported, and it was expected that the figure for 1921 would reach 200,000 tons. The deposits are estimated at 9,000,000,000 tons, sufficient to supply the Scandinavian and other northern markets for many years. Cost of transportation—which is at present very high—will be an important control of output.

PHYSICAL GEOGRAPHY

Forecasting the Crops from the Weather. In an earlier note (*Geogr. Rev.*, Vol. 11, 1921, p. 295) mention was made of the fact that the yield of cotton can be more accurately forecast from mathematical analysis of weather factors than from the reported condition of the crop itself. And this seems to be true of most crops. The yields of a crop in the various years of record are compared with temperature and rainfall conditions in each of the months or selected combinations of months during and preceding the growth of the crop. The relations found may then be used as factors or additive elements in arriving at an idea of the probable yield, the estimate becoming better and better as the successive critical periods are passed. R. H. Hooker, who in 1907 made a successful forecast of England's crops through the use of weather data, chose in his presidential address before the Royal Meteorological Society to discuss the history, present status, and outlook in "Forecasting the Crops from the Weather" (*Quart. Journ., Royal Meteorol. Soc.*, No. 198, Vol. 47, 1921, pp. 75-99). There are two bases on which such forecasts can be made: one is periodicity, and the other, the known effects of weather preceding or during the growing season. Our knowledge of cycles is as yet too indefinite to allow forecasts of value to be made year after year. One of the troubles seems to be, as Hooker points out, that there are too many cycles of varying period operative at the same time.

Nevertheless, Professor H. L. Moore has brought forward strong evidence in support of an 8-year cycle ("Generating Cycles Reflected in a Century of Prices," *Quart. Journ. of Economics*, Vol. 35, 1921, pp. 503-526, and "The Origin of the Eight-Year Generating Cycle," *ibid.*, Vol. 36, 1921, pp. 1-29). After establishing the closeness of the relation between crop yields and prices and showing for each during the last few decades the likelihood of the existence of an 8-year cycle, in England, France, and the United States, he extends the period of his investigation back to 1818 on the basis of wholesale prices (Sauerbach's indices), and to 1760 by the use of the price of grain (Poynting), both in Great Britain, and finds the same 8-year cycle extending back at least 160 years. The cycle, it appears, is a combination

of one of 7.38 and another of 8.73 years. For this apparent cycle in crop yields and the necessarily corresponding one in prices there should be a meteorological cause. Analyzing the rainfall of May and June in the Dakotas, and annual rainfall in the Ohio Valley and in Illinois, Professor Moore finds an apparent 8-year cycle corresponding to that in crop yields. He cites the 7.3-year cycle (cf. the 7.38-year component of the 8-year cycle) in the rainfall-controlled annual growth of trees on the central plateau of Arizona. He also points to the 8-year periodicities in winter barometric pressure in central Europe and to the apparent 8-year period in the pressure of the United States. The crests of the 8-year pressure, rainfall, and crop-yield cycles in the United States and Europe have come generally in the years 1874, 1882, 1890, 1898, 1906, and 1914, or a year earlier. As it is reasonable to expect a cosmical cause for congruent cycles found in North America and Europe, Professor Moore calls attention to the 8-year period in the distance between Venus and the earth, Venus having been nearest us in the years 1873, 1881, 1889, 1897, 1905, 1913, and 1921. While conjunctions of these two planets occur every 1.6 years, it is only at every fifth conjunction, or every eight years, that Venus is nearly or actually between the sun and the earth, owing to the fact that the orbits of Venus and the earth do not lie in the same plane. How this could affect the earth's weather is a difficult question: Professor Moore suggests that since Venus always has the same face to the sun, the resulting perpetual tempest on that planet, from the cold side to the hot one and return may have some effect on the passing solar radiation, and therefore on the earth's weather.

The results of a searching and highly suggestive investigation of economic cycles in western and central Europe have just been published by Sir William H. Beveridge ("Weather and Harvest Cycles," *Econ. Journ.*, Vol. 31, 1921, pp. 429-452). Instead of an 8-year cycle a 15.3-year cycle and especially its double, a 30.6-year cycle, and still longer ones are indicated. After having discovered the 15.3-year cycle in exports from Great Britain, the author found it confirmed by harmonic analysis in records of European wheat prices since 1550. In seeking an explanation, he shows that this cycle probably arises from a temporary combination of two or more shorter ones, namely: cycles of 4.374, 5.11, and probably also 2.74 and 3.71 years. The first and last correspond to well-known periods in sun spots and solar prominences, respectively, while the other two are in evidence in meteorological records. It may be noted here that the 7.38-year and 8.73-year cycles, which Professor Moore thinks may be factors of the apparent 8-year cycle, are almost exactly double the 3.71-year and 4.374-year cycles, respectively. Harmonic analysis confirms the supposition that there is an elemental cycle of 5.11 years in wheat prices but does not offer convincing proof for the 4.374-year cycle. Important conjunctions of the four short cycles occur at intervals of 123, 148, 271, and 608 years, which are strikingly apparent in European famines during the past thousand years. It seems that the effects of these cycles taken individually are not very important, e.g. plentiful rainfall accompanying the crest of a cycle acting alone may produce an excellent crop, whereas the excessive rainfall on the conjunction of rainy peaks of two cycles occurring during a critical portion of the crop season is likely to make a poor harvest. Sir William urges further investigation immediately, before the arrival of 1923, which, being 608 years after the worst famine in the history of western Europe and 123 years after the memorable dearth of 1800, may be one of rain, cold, and bad harvest, and therefore lead to a disastrous economic year for that region in 1924.

Whatever may be the outcome of a further study of this 8-year cycle, the immediate possibilities of the use of our knowledge of the effects of current weather on the growing crops are highly encouraging. What we know about weather and American crops is ably summarized by our chief investigator in this field, Professor J. Warren Smith, in his "Agricultural Meteorology" (New York, 1920; see elsewhere in this *Review*). Those investigations mentioned by Hooker relate mostly to the eastern hemisphere. So far as is known the earliest attempt to estimate the size of a crop by the weather was that of Governor Rawson, of Barbados, who in 1874 published an account of how the sugar crop in hogsheads amounted to 800 times the inches of rainfall of the year preceding the growing season. Gilbert and Lawes, in 1880, found that a temperature higher than average and a prevailing deficiency of rain in winter and spring lead to the highest yield of wheat. Sir Napier Shaw, in 1905, found that the yield of wheat in England was 39.5 bushels per acre minus five-fourths of the previous autumn rainfall in inches. Then Hooker compared wheat yields with temperature and rainfall statistics at all periods of the 18 months before harvest and found that the rainfall between mid-September and early November was the most important. Apparently, just as in eastern Maryland, there is more than enough rainfall for wheat, so that the less

the better. In a region in India where the autumnal rainfall is evidently usually too little for starting wheat, S. M. Jacob found (1910) that the more rainfall in autumn the better the yield. Evidently there must be regions where the rainfall is such that any deviation from the average should give a reduced yield. In Scotland, where A. Watt, in using the ordinary correlation method, could find no connection between spring rainfall and the yield of oats, the usual weather conditions appear to be just right, for in drier England Hooker found that the more spring rain the better the yield of oats.

By using a more or less rough cut-and-try method suitable for showing crop-weather relationship under optimum conditions, Kincer found factors that give a theoretical yield of cotton in Texas showing a correlation coefficient of 0.88 with the actual; and Jacob, with weighted rainfall factors and the subsequent yield of wheat in Jullundur, obtained a coefficient of 0.91. A. Walter has probably carried out the most exhaustive analysis on any single crop. The degree of wetness (monthly rainfall corrected by the ratio of rainy days to total days) at various periods of the year was compared with the yields and a formula obtained. Then the residuals were correlated with temperatures. On the basis of both rainfall and temperature the yields are indicated quite accurately—so much so that in three years when hurricanes did great damage the difference between the actual yield and the computed yield has been set down as the damage done by the hurricanes, and the theoretical yield has been offered to insurance underwriters as the basis for settling damage claims after a hurricane.

For different regions, on both sides of the optima the most thorough work has been done by A. Wallén, in Sweden, who has charted the correlation coefficients between rainfall and temperature on the one hand and the four cereals (wheat, barley, oats, and rye) on the other, for each of the 26 governments of Sweden in every month of the growing period of the crop during the thirty years 1881–1910. His theoretical yields come very close to the actual. For the same crop the correlations in the north may be the opposite of those in the south, indicating that normal weather in the south may perhaps be too warm and moist for certain phases of the crop's development, whereas the normal weather in the north is too cool and dry. Mathematical treatment leading for each crop to the determination of a curve showing closely the weather control over yield would probably establish general laws applicable in any region.

Hooker deprecates the lack of application of the results already shown to be of such value in the actual forecasting of crops. He points out, however, that there is much more that can be learned about the relation between weather and crops if only the properly qualified persons will attack the large mass of exact data now available for such comparisons. Under Louis Dop, chairman of the Committee on Agricultural Meteorology, the International Institute of Agriculture at Rome is trying to direct the efforts of agricultural meteorologists all over the world. With adequate knowledge of the detailed relationship of the weather elements to the condition of crops we could modify farm practice as regards planting in order to bring a critical stage of the crop at a time most likely to have favorable weather. With forecasts even for a few months in advance, substitute crops could be raised to prevent an imminent crop failure, or at least steps could be taken in advance of a crisis to insure sufficient food supply. Few investigations hold out such promise of valuable pre-harvest safeguards, against a threatened scarcity of food.

CHARLES F. BROOKS

HUMAN GEOGRAPHY

Recent Movements of Population. The political, social, and economic causes with which the great migrations of the past have been associated have never before been at work on such a gigantic scale in the three continents of the Old World at the same time. In this statement is found the moving idea of the author of an able and extremely interesting review entitled "The Migration of the Races" (*The Round Table*, March, 1921, pp. 241–273). The laboring classes have long acquired a mobile character which makes them responsive to the factors affecting migration. They are supplied in their own language with tempting information on distant parts of the world. The Slavs and Italians particularly were accustomed before 1914 to work in mines and on railways in other countries of both Europe and America and return seasonally to their own. In spite of all the causes, associated with the war, that checked immigration into America, there threatened a turn of affairs that would swamp the United States with low-class aliens having no training in the processes of

modern democracy and no appreciation of their own political responsibilities and opportunities. How far can a policy of restricted immigration be carried? Australia proposes to maintain her homogeneity even if this means that she is to remain without an adequate population. She fears to lose her internal unity if she admits incompatible elements. Where will this bring the empire? Will an artificial dam prove strong enough to keep out the colored races?

The restlessness of the human race was never so great as today. Some old tyrannies have disappeared, but new ones have sprung up. Hatreds are even stronger than they have been in the past. So intense is the feeling against the restrictions and difficulties of the Old World that not even the present want of means for the journey or the business depression in the new countries to which the emigrant would go are sufficient in themselves to hold back the tide. In 1907 over a million and a quarter immigrants entered the United States, and in that year President Roosevelt appointed a commission to study the subject and directed public attention to the importance of regulating immigration. In 1917 a literacy test was introduced and the admission tax raised. The war of course stopped the flow for a time, and, in the first half of 1919, 4,000 more people left the United States than entered it. In 1920 the tide had set again this way, with 430,000 arrivals, though 288,000 aliens also left the United States in that year.

We thus see the disarrangement of war in still another of its aspects—its effect upon the movement of peoples. Before the war a complex, widely extended economic system had been developed. Its success depended upon a continuance of that security which had brought it into being. Instead of stopping the flow of emigration from Europe and Asia the war tended to hasten it. Agriculture alone cannot absorb a notably large number of people immediately, and it is immediate relief that the would-be immigrant desires. He does not look forward to a future day when business will revive, for he has no capital on which to subsist, and his whole habit of mind is one of direct relation to the problem of food, clothing, and shelter.

From being largely an economic problem, as before the war, the migration of peoples has become now also a political and a social problem. America has built up her railways, her municipal improvements, and her great mills and factories to a very large degree upon imported labor. At the same time that the streams of labor were pouring into the country, her agricultural production was so high that streams of agricultural products were crossing the ocean to industrial Europe. With the continued industrialization of the United States the ratio of export declined, but the manufacturer still clamored for cheap labor. "Improvements in machinery enabled them to do without much intelligence or skill, but cheap labor was indispensable." The native-born American did not wish to engage in the work that thus fell naturally into the hands of the immigrant. Rapidly expanding industrial enterprises took care of the incoming laborer and the second generation of laborers also, the best of whom drifted into other occupations.

By contrast European lands enjoyed a more balanced life, and their populations were more sensitive to stimuli abroad. In the case of the United Kingdom, 20 per cent of the grain and vegetables consumed were imported (for 1913), and 60 per cent of the meat supply. Germany imported 20 per cent of her whole food supply, and France 20 per cent of her grain and vegetables and 60 per cent of her meat. The question of food is thus fundamental to the question of the movement of people in those countries, just as the early Greek colonies in Asia Minor were dependent in part upon the question of food, and just as Japan has sought an outlet for her population in recent years. If life presses upon the individual at home, the modern fast steamship and the lure presented to him by the steamship company and by the country desiring his aid prove too much for him, and he responds quickly and in large numbers. So long as we were confident of our political and social systems, so long as they seemed to work to our advantage regardless of the plight of the incoming laborer, we were little bothered by his influence upon our life, even though we knew that our democratic institutions and ideals meant little to him. It is a commonplace that the war showed that the old bonds between the immigrant and the home country were so strong that we could not count upon a united country. This focused attention upon the character of our alien elements. "Much as our vineyards need laborers we have a lamp to keep alight."

At first our immigrants were chiefly from northern Europe. Latterly they have been from southern and southeastern Europe. The grand total of American immigrants from the British Islands is still larger than from any other country. It stands at almost exactly 25 per cent for the last hundred years, and about half of our entire population is reputed

to be Anglo-Saxon by race. All this is changing, and the change is taking place now. It affects not merely our political forms and social institutions, but it also affects the quality of our people. It would be rash to claim that the last word in democracy will be spoken by Anglo-Saxons. The ultimate goal may be reached by some other race, but the public and its leaders are profoundly convinced that the state of education and the intellectual character of the populations of southern and eastern Europe dilute and weaken our national character, if they do not introduce a positively explosive element into it.

Complementing the paper described above reference may be made to an article, "Les migrations internationales de 1901 à 1920," in the October, 1921, number of the *Bulletin de Statistique générale de la France*. The article referred to consists largely of statistical tables covering the emigration and immigration of the more important countries for the past 20 years. Figures for the United States for 1921 are also available and are specially interesting in regard to the working of the Immigration Act of 1921 which limits the yearly quota from any of the countries of the Eastern Hemisphere to 3 per cent of the total of residents in the United States at the last census who were born in that country. The total number of immigrants admissible for 1921-1922 under this act is 355,825 (not 358,448 as in the article) as compared with 805,228 who entered in the fiscal year 1920-1921, and 1,218,480, the total for 1913-1914. It is probable that the quota for 1921-1922 will not be filled since only 189,421 were admitted from June, 1921, to January 31, 1922. Quotas, however, for the following countries and regions have already been exhausted: Greece, Yugo-Slavia, Poland, Eastern Galicia, Portugal (including the Azores and Madeira), Spain (including the Canary Islands), "other Europe" (including Andorra, Gibraltar, Malta, Memel, Monaco, San Marino, Iceland), Palestine, Syria, Turkey, Smyrna District, "other Asia" (including Mesopotamia, Persia, Rhodes, Cyprus, and territory other than Siberia which is not included in the Asiatic Barred Zone), Africa, Australia, New Zealand, and "Atlantic Islands." Whereas the Polish quota is now exhausted, aliens from the area between the "Curzon Line" near Brest Litovsk and the Treaty of Riga boundary are still admitted, being charged to the quota of Russia. Immigrants from Bessarabia also are charged to Russia rather than to Rumania. It will be noticed that the United States has been obliged to practice a recognition of the new territorial arrangements, including plebiscites, because of the restrictions of the new act. This recognition is not to be regarded as having any political significance, however, or as involving the recognition of new governments, boundaries, or transfers of territory except as have already been formally recognized.

Cuba, the figures for whose average yearly net immigration for the periods of 1905-1913 and 1915-1918 are practically the same (21,000), alone maintained during the war an immigration figure comparable to prewar figures. There the falling-off of European immigration has been met by an influx of Haitians and Jamaicans. During the war and up to 1920, emigration from Australia and the Argentine Republic exceeded immigration into those countries. On the contrary, statistics show that, whereas before the war emigration in Great Britain, Spain, and the Netherlands exceeded immigration, more arrivals than departures were registered from 1915 to 1918 (transportation of troops is not included in the figures). There is some question, however, as to what proportion of these figures represent actual emigration and immigration, since Holland counts as migrants all who change the country of residence for however short a time while Great Britain counts only those who change residence for a year or more.

At present Great Britain and Ireland are rapidly returning to prewar emigration. Italians are going largely to France. Belgians, also, whose emigration figure for 1919 is 38,400, the largest in the history of the country, are going in large numbers to northern France, from which they will eventually return. Large numbers of Belgians, too, came to the United States in 1919, as did also practically the entire emigration from the Netherlands, which in this year was 45,400, exceeding all previous figures.

The article suggests that the steamship companies which made a business of transporting emigrants to the United States will attempt to turn the tide toward South America now that it is evident that immigration into the United States is to be restricted for some time to come. It is to be noted, however, that the countries of western Europe seem likely to fail to fill their quotas for the current fiscal year.

Spanish Emigration. Much has been said about the tide of Spanish immigration into America, but definite statistics regarding this movement have seldom been given. The issuance of "La Emigración Española Transoceánica, 1911-1915" (Madrid, 1916), an

official publication of the Higher Council of Emigration (Consejo Superior de Emigración), supplies many important data concerning this matter. According to the official figures there published, the total transoceanic emigration during the five-year period referred to amounted to 602,081, or over 3 per cent of the population of the country. Furthermore, in the above figures is not included the emigration from Spain via foreign ports, which sometimes reaches a fourth part of that officially recorded, nor the emigration to other European countries and North Africa. Adding this we find that the emigration to America was nearly four per cent of the total population. But for the abnormal conditions (economic crisis and the World War) which marked two of the five years (1914 and 1915), the numbers would probably have been far beyond the figures given, since the curve of emigration was rising rapidly during the years 1910-1913.

It is evident that Spain views with a certain amount of concern such an exodus of her inhabitants. But she also recognizes the movement as a natural expansion, which, if properly directed and followed up, offers her an opportunity to recover something of her former influence in America; an influence which was gradually diminishing from the time of the wars of independence until the loss of Cuba and Porto Rico in 1898, when Spain ceased to figure in the affairs of the New World. Under proper direction this new movement of her people to the western hemisphere might mean a re-conquest of Hispanic America, not political but cultural.

The greater part of the emigrants from Spain go to the Argentine. In 1913, for example, of the 151,000 emigrants 101,636 had that country as their destination, while during the entire five-year period those who went to the Argentine numbered 403,164, out of a total emigration of 602,081—a little over 66 per cent. So great, in fact, was the movement of people from Spain to the Argentine in these and preceding years that from 1910 it occupied first place in the current of immigrants into that country, outnumbering even the influx from Italy, which had formerly topped the list.

Cuba was a poor second in the number of Spanish emigrants received during this five-year period, though in 1915 she actually received a larger number than the Argentine. Her total for the five years is given as 135,759, or 22.5 per cent of the total. Next in order came Brazil, though with but 31,516 (or 5 per cent) during the period. Other countries figuring prominently in the list were Uruguay, Mexico, and the United States.

The larger part of the immigration from Spain was from the regions of Galicia, Asturias, and León, in the northwest. The provinces along the Mediterranean (except Castellón, Tarragona, and Gerona) also contributed largely to the tide of emigrants, as did also the north-central provinces in Old Castile, Navarre, and the Vascongadas. In general the coastal provinces, probably because in closer contact with maritime travel, were more largely represented in the emigration than those farther inland. Vigo, Coruña, Barcelona, and Almería were the favorite ports of departure.

Contrary to the usually accepted idea, the writer of the volume on emigration above referred to declares that there does not exist the so-called "swallow" migration between the La Plata region and Spain. There is a constant movement to and fro, a movement which corresponds closely to the harvest seasons in the two countries which, lying on opposite sides of the equator, have their seasons reversed; but this, it is asserted, is not the result of a seasonal migration of the same individuals. The return movement is rather of those who have spent some years in the South American countries and choose the close of the summer season there as the best time to return to their former homes. A like consideration is thought to influence the time of departure from Spain, since the months of September, October, and November show the highest rate of sailings. It would seem doubtful if the earnings obtained by a few months of harvest labor, even with the high wages paid in the La Plata region, would warrant any such seasonal migration of individuals as is often spoken of. However, more detailed statistics than those published by the governments concerned would seem necessary to establish the facts in regard to this seasonal movement.

GEOGRAPHICAL NEWS

ASSOCIATION OF AMERICAN GEOGRAPHERS

Seventeenth Annual Meeting. The Association of American Geographers met in Washington December 29-31, 1921, for the seventeenth annual meeting. The sessions were held in Hubbard Memorial Building by invitation of the National Geographic Society.

The Presidential Address of Miss Semple, entitled "The Influence of Geographic Conditions upon Ancient Mediterranean Stock Raising," was delivered at the afternoon session of December 30. It gave in outline the results of a thorough study of the subject from classical sources and from observations made during a recent journey in Greece. Miss Semple laid stress upon the continuity of response to environment throughout the long period of from three to two thousand years, dwelling especially on the seasonal movements of peoples engaged in pastoral pursuits and on the peculiar adaptability of different regions for the raising of particular kinds of stock.

Twenty-seven papers were announced on the final program, all of which were given with the exception of "The Barrier Reef of Tagula, New Guinea," by Professor W. M. Davis, which was read by title. "The Problem of Representing the Earth's Surface on a Map" was given by Oscar S. Adams (introduced by William Bowie), and there was a paper on "Some Results of the Recent Cruise of the *Carnegie*, 1919-1921," by L. A. Bauer and J. P. Ault. General physiography was represented by "Certain Features of Arid Region Topography," by N. M. Fenneman; "The Evolution of the Stepped Canyon Profile of Glaciation," by F. E. Matthes; and "Shore Changes Due to Current and Wave Action," by G. T. Rude.

A number of papers discussed aspects of the physical geography of the United States: "A Proposed Alteration of the Physiographic Map of the United States," by N. M. Fenneman; "The Trend of Land Utilization in the United States," by O. E. Baker; "A Soil Map of the United States" and "The Soil Geography of the Northern Great Plains," by C. F. Marbut; "Topographic Types about Nashville," by A. E. Parkins. Dealing with the human side were "Some Regions in the United States with Stationary Population," by R. M. Harper; "City Growth and City Advertising," by Robert M. Brown. Human utilization of regions was the basis of "A Regional Economic Map of North America," by J. Russell Smith.

H. N. Whitford spoke on "The Climatic, Genetic, and Economic Relations of the Forests of the Torrid and Temperate Zones," and C. S. Scofield on "Limitations of Irrigated Agriculture."

Papers in the Latin American field were given by O. F. Cook, "Peru as a Center of Domestication," and E. F. Bransom (introduced by H. H. Barrows), "Geography of Eastern Costa Rica." Regional papers outside of the Americas were "Geographic Setting of Chengtu, China," by George D. Hubbard, and "Urundi," by H. L. Shantz.

Work of the National Geographic Society was described by Gilbert H. Grosvenor, "The National Geographic Magazine," and N. M. Judd (by invitation), "The Pueblo Bonito Expedition of the National Geographic Society." Two papers dealt with educational geography: "Twenty-Five Years' Growth in Collegiate Geography" (in the United States), by George J. Miller, and "Some Observations on the Status of Geography in Western and Central Europe," by W. L. G. Joerg. J. Paul Goode spoke on "The American Need for Authority in Fixing the Form of Foreign Geographic Names." A survey of the publications of the Association was made by Richard E. Dodge in "A Decade of the Annals."

Members of the Association were afforded an excellent opportunity of learning something of the geographic work in the Federal Service. This was the theme of the Round Table Conference held at the evening session of December 29 at which the discussion was led by A. H. Brooks and C. F. Marbut. Work in the various departments was described as follows: State Department by Colonel Martin, Hydrographic Office by G. W. Littlehales, Geological Survey by P. S. Smith, Bureau of Plant Industry by H. L. Shantz, Bureau of Farm Management by O. E. Baker, Bureau of Soils by C. F. Marbut, Bureau of Fisheries by H. F. Moore. At another session an interesting series of papers (requested) dealing with geography and trade was contributed by W. S. Culbertson of the U. S. Tariff Commission ("Colonial Tariff Policies"), Julius Klein, of the U. S. Department of Commerce ("Geography in the Bureau of Foreign and Domestic Commerce"), and E. S. Gregg, of the U. S. Department of Commerce ("Influence of Geographic Factors on Ocean Shipping"). One of the most interesting features of the meeting was the social evening held at the Geological Survey Building at which was given an exhibition of geographic work and a demonstration of map methods of the Survey.

Joint Meeting of the Association of American Geographers and the American Geographical Society. At the building of the Society on April 28 and 29, there will be held the annual joint meeting of the Association of American Geographers with this Society.

A preliminary program is in preparation and will be mailed to all out-of-town Fellows upon request. The final program will be distributed a week before the meeting and will also be printed in full, with a brief synopsis of each paper, in the July number of the *Geographical Review*. This brief preliminary announcement is made in order that anyone interested may have the opportunity of attending the meeting.

OBITUARY

JULIUS VON HANN. It is nearly half a century ago that Julius von Hann began to take his place as the universally acknowledged leader of meteorological science, and for many years previous to his death he stood out head and shoulders above his fellow workers. He grew up with and himself was, as it were, a large part of the rapid modern development of meteorological science. He was able, through his intense application and industry, and because of his great intellectual powers, not only himself to contribute largely to the advance of his science but also to keep closely in touch with all the work which was being done by investigators and writers everywhere. For years his many contributions to the *Meteorologische Zeitschrift*, often modestly signed J. H., were never-failing evidence of his truly extraordinary grasp of his subject and of the universal range of his reading. He was, as fully as any one human being can be, a living encyclopedia of his chosen science. And this is in no sense to be taken as suggesting that his mind was merely a storehouse of dry, hard facts. He was very human. He saw the many and varied relations of meteorology and climatology to human life and activities, and he was always on the lookout for opportunity to emphasize these relations. His writings were always clear, vivid, and interesting. His "Handbuch der Klimatologie," for example, which inevitably has to deal largely with "dry" statistical details, is enlivened throughout by carefully selected, vivid, first-hand descriptions of weather types and of human or botanical responses to the climatic environment.

His fellow workers who remain are dynamic or physical meteorologists, or climatologists, or are specializing in this or that subdivision of their science. This is a natural and inevitable situation at the present stage of our knowledge of the atmosphere. It cannot well be otherwise. But it leaves a great gap which no one man can ever again fill, because meteorology has now grown to such an extent that specialization is the rule, and no single mind will ever again master all of its details. Hann's "Lehrbuch der Meteorologie" is the one absolutely indispensable textbook in that science. Upon his "Handbuch der Klimatologie" all studies of climatology must, for years to come, be based. This extraordinary grasp of the whole wide range of his science he maintained practically till the day of his death.

Somehow, when a man like this passes away, a bare statement of the essential facts of his life and a list of his contributions to science seems unnecessary and futile. Yet there is something singularly significant in the fact that this man, living a very simple life, with very few changes of residence, extended his interests and his reading to all parts of the world. He knew the geographical and climatological conditions of almost every corner of the globe as intimately as if he had himself lived there. Hann—for thus, and not as von Hann, he will oftenest be recalled—began life as a school-teacher. At the age of twenty-nine he entered the Central-Anstalt für Meteorologie in Vienna. From 1874 to 1897 he was its Director, an office from which he retired at the age of fifty-eight. For many years he was also Professor of Cosmical Physics at the University of Vienna. His work for meteorology did not cease when he ceased to be Director. He soon went to Graz, where, in the Physikalisches Institut, he wrote his "Lehrbuch der Meteorologie," whose three editions bear the dates 1901, 1906, 1915. The "Handbuch der Klimatologie" he wrote while in Vienna. The three editions of this book bear the dates 1883, 1897, 1908–1911. These two books are Hann's monumental publications. It is almost literally true that no student of meteorological science can do a day's work without referring to them. Throughout his long editorship and joint editorship of the *Meteorologische Zeitschrift* (1866–1920) he steadily contributed to the pages of that journal a series of articles and notes which are invaluable, for in these he revised, summarized, commented upon, and put into permanent form a vast body of meteorological and climatological material.

Hann died in Vienna, October 1, 1921, in his eighty-third year. No more fitting tribute could possibly be written of him than that contained in the notice of his death sent out by his former colleagues in Vienna. "Ein Leben ununterbrochener Geistesarbeit und reiner Forschung im Dienste der Wissenschaft ist abgeschlossen. Aber ungezählte Fäden führen von Hann's Werken in alle Länder der Erde und wirken in seinem Sinne fort."

R. DEC. WARD